[57]   ABSTRACT

An interactive system for a local intervention inside a region
of a non-homogeneous structure, such as the skull of a
patient, which is related to the frame of reference (R_2) of an
operation table, and which is connected to a reference
structure comprising a plurality of base points. The system
creates on a screen a representation of the non-homogeneous
structure and of the reference structure connected thereto,
provides the coordinates of the images of the base points in
the first frame of reference (R_1), allows the marking of the
coordinates of the base points in R_2, and allows the carrying
out of the local intervention with an active member such as
a trephining tool, a needle, or a radioactive or chemical
implant. The systems also optimizes the transfer of reference
frames between R_1 and R_2, from the coordinates of the base
points in R_2 and the images in R_1 by reducing down to a
minimum the deviations between the coordinates of images
in R_1 and the base points in R_1 after transfer. The system also
establishes real time bi-directional coupling between: (1) an
origin and a direction of intervention simulated on the
screen, (2) the position of the active member.

16 Claims, 13 Drawing Sheets